

BIOHACK NOTES



# ANATOMY OF FLOWERING PLANTS

- BASED ON ACTIVE RECALL AND SPACED REPETITION
- TARGET 360/360 IN NEET BIOLOGY & 100/100 IN BOARDS!



**PARTH** GOYAL

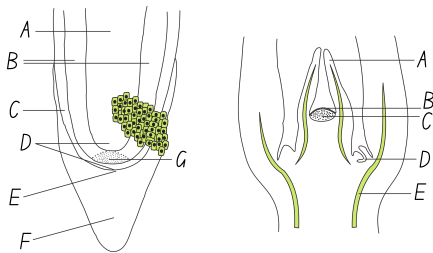


01. Study of internal structures of plant is called \_\_\_\_\_
02. Internal Structure don't show adaptation to diverse environment. T/F
03. In tissues, cell may have different origins but common functions. T/F



## • MERISTEMATIC TISSUES

04. Specialised regions of active cell division are called
05. Greek word \_\_\_\_\_ means "divided".
06. Meristems which produce primary tissue are called \_\_\_\_\_
07. Identify the diagrams and its labellings of both.



08. Some "left behind" cells from Shoot apical meristems, constitute the \_\_\_\_\_
09. Example of primary meristems (2)
10. Intercalary meristems occur in \_\_\_\_\_
11. Secondary meristems also called \_\_\_\_\_ meristem or \_\_\_\_\_ meristems.
12. Examples of lateral meristems (3)
13. Intrafascicular cambium also called
14. Dermal tissues, ground tissues and vascular tissues are formed by apical meristem. T/F
15. \_\_\_\_\_ form major components within organs.
16. Parenchyma can have these shapes ? (5)
17. Parenchyma have thick wall because they are closely packed. T/F
18. Parenchyma functions (3)
19. In most Monocot/Dicot Plants, collenchyma occurs in layers below \_\_\_\_\_
20. Cells in collenchyma are thickened by the deposition of (3)
21. Intercellular spaces may be present in collenchyma. T/F
22. Sclerenchyma provide support to petiole of leaf.
23. Sclerenchyma usually contains protoplasts.
24. Sclerenchyma are of 2 types -
25. Sclereids are found in (4)





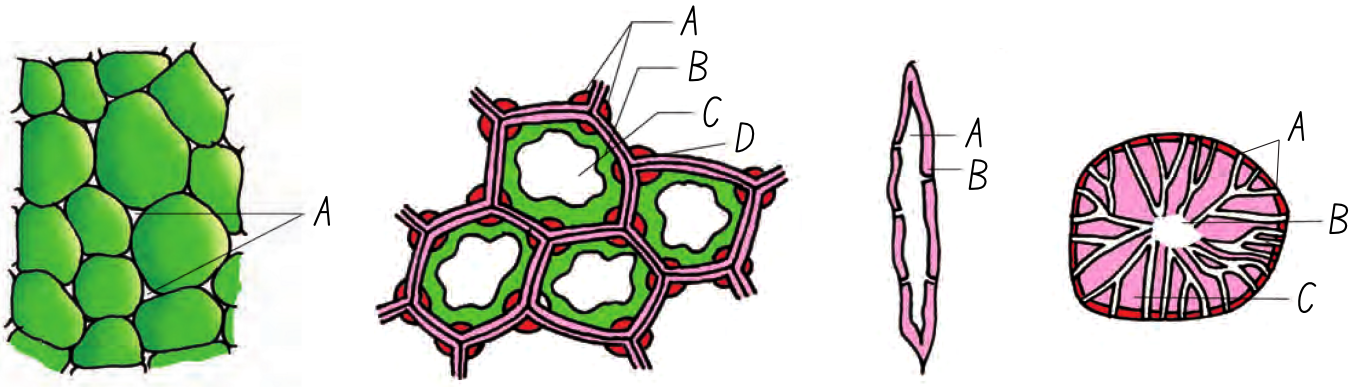


## • PERMANENT TISSUES

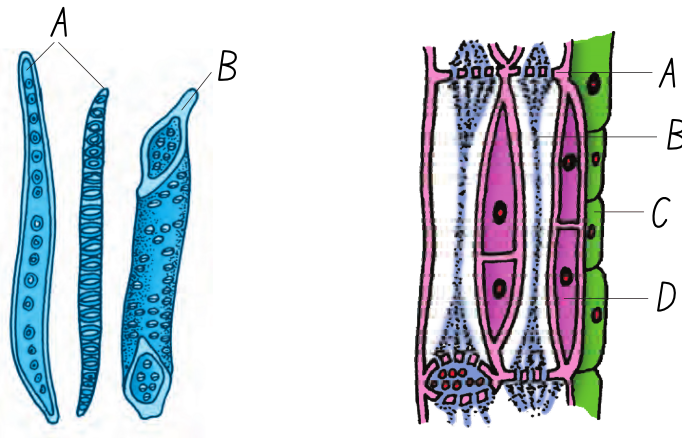
26. 4 elements of xylem –
27. Living element of xylem is
28. \_\_\_\_\_ lack vessels in their xylem.
29. Vessels have tapering ends. T/F
30. Vessels is made of many cells called \_\_\_\_\_
31. Vessels members are not interconnected through perforations.
32. Characteristic feature of angiosperm is presence of \_\_\_\_\_
33. Xylem fibers have obliterated central lumens. T/F
34. In xylem parenchyma, cell wall is made up of cellulose. T/F
35. Xylem parenchyma store food in form of \_\_\_\_\_, and other substance like \_\_\_\_\_
36. Radial conduction of water take place by \_\_\_\_\_ tissue.
37. Primary xylem two types –
38. In stems, protoxylem lies towards the \_\_\_\_\_ and the metaxylem lies towards \_\_\_\_\_
39. In stem, xylem arrangement is endarch/exarch.
40. In root, xylem arrangement is endarch/exarch.
41. Phloem composed of (4)
42. In gymno, \_\_\_\_\_ & \_\_\_\_\_ are replaced by \_\_\_\_\_ & \_\_\_\_\_ respectively.
43. Sieve plates are found in end/between of sieve tube.
44. Sieve element contains a nucleus. T/F
45. \_\_\_\_\_ are specialised parenchyma/collenchyma cells, which are associated with sieve tube.
46. Sieve tube and companion cells are connected by \_\_\_\_\_
47. Companion cells help in maintaining the \_\_\_\_\_ in sieve tubes.
48. Phloem parenchyma stores \_\_\_\_\_ and other substances like \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.
49. Phloem parenchyma have tapering ends. T/F
50. Phloem parenchyma is absent in which types of angiosperms ?
51. Phloem fibers also called \_\_\_\_\_
52. Phloem fibers are made up of \_\_\_\_\_ chyma.
53. Phloem fibers are generally present in primary phloem. T/F
54. Phloem fibers of \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ are used commercially.
55. Metaphloem have bigger sieve tube than protophloem. T/F



- Simple tissues



- Complex Tissues



## • THE TISSUE SYSTEM

56. On the basis of structure and location, the 3 types of tissue system are –

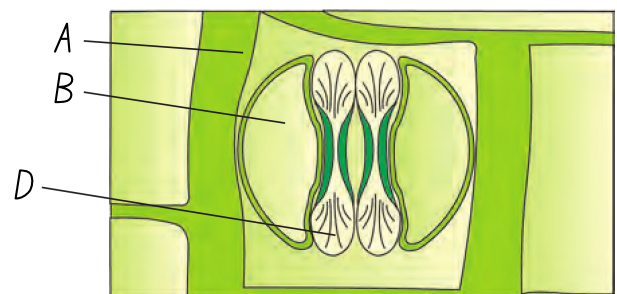
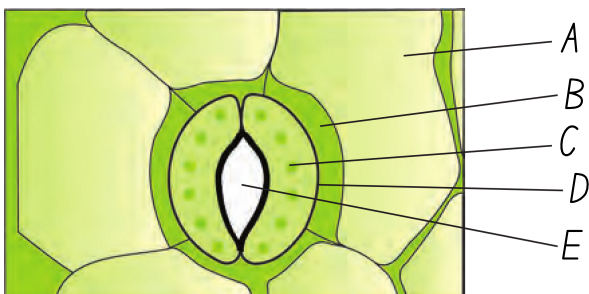
57. Epidermal tissue system comprises (3)

58. Epidermis cells are sclerenchymatous. T/F

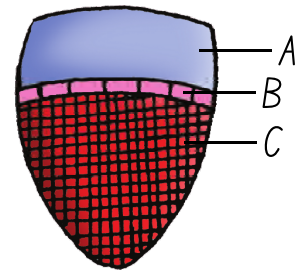
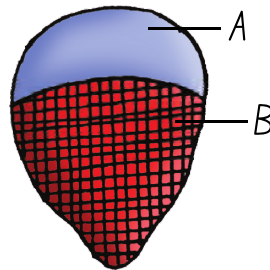
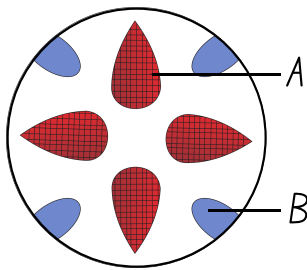
59. Cuticle prevent loss of \_\_\_\_\_

60. Cuticle is absent in \_\_\_\_\_

61. Diagram of stomata



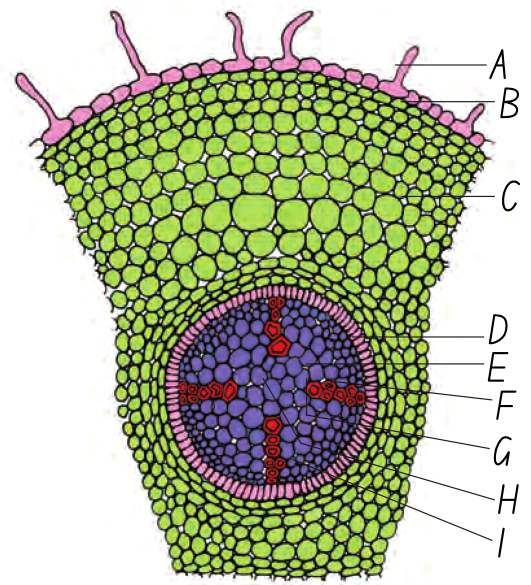
62. In \_\_\_\_\_, guard cells are dumb-bell shaped.
63. The outer wall of guard cell is thick while in the inner wall is thin. T/F
64. Guard cells don't have chloroplasts. T/F
65. Stomatal Apparatus include (3)
66. Root hairs are unicellular/multicellular.
67. Trichomes are usually uni/multicellular
68. Trichomes help in preventing \_\_\_\_\_ loss due to \_\_\_\_\_
69. In leaves, ground tissue is called \_\_\_\_\_
70. In \_\_\_\_\_, cambium is present between phloem and xylem.
71. Radial arrangement is seen in \_\_\_\_\_
- Various types of vascular bundles : (a) radial (b) conjoint closed (c) conjoint open



## • ANATOMY OF DICTOYLENDONOUS & MONOCOTYLEDONOUS PLANTS

### • DICOT ROOT

72. The outer most layer of dicot root is called \_\_\_\_\_
73. Innermost layer of cortex is called \_\_\_\_\_
74. Casparian strip is made up of waxy material called \_\_\_\_\_
75. Pericycle is thin walled. T/F
76. Pith of dicot root is large/small.
77. Initiation of lateral roots and vascular cambium during secondary growth takes place in \_\_\_\_\_
78. Parenchymatous cell between xylem and phloem called \_\_\_\_\_
79. Stele constitute -



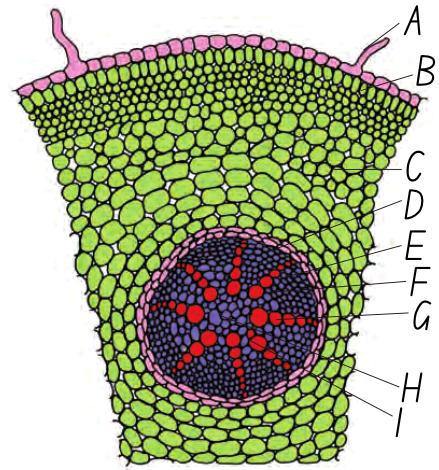


## • MONOCOT ROOT

80. Monocot root usually have more than \_\_\_\_\_ xylem bundles called as \_\_\_\_\_

81. Pith is large in monocot root.

82. Monocot root undergo secondary growth. T/F



## • DICOT STEM

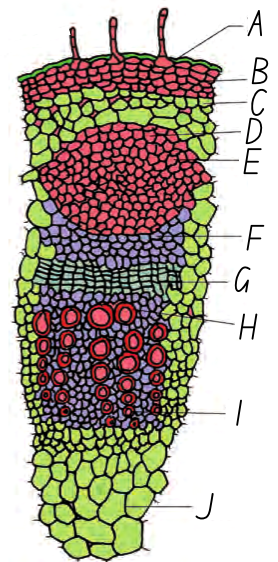
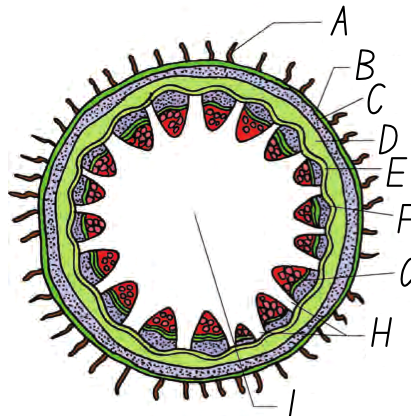
83. Dicot stem have an extra layer called \_\_\_\_\_ which is parenchymatous/collenchymatous in nature.

84. The cells of endodermis in dicot stem are rich in \_\_\_\_\_, the layer is also called \_\_\_\_\_.

85. \_\_\_\_\_ is present in the form of few semilunar patches of parenchyma/sclerenchyma.

86. Arrangement of \_\_\_\_\_ in a form of ring is the characteristic feature of \_\_\_\_\_ stem.

87. Pith in dicot stem is parenchymatous. T/F



## • MONOCOT STEM

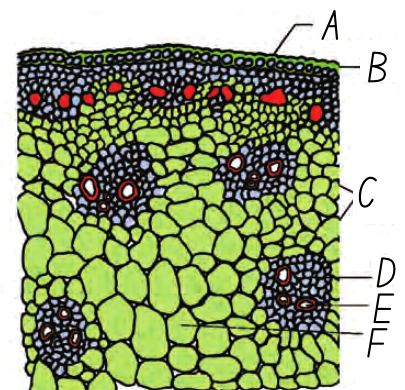
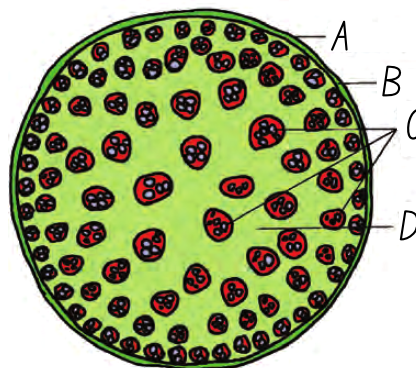
88. Hypodermis of monocot stem is paren/collen/sclerenchymatous.

89. Each vascular bundle is surrounded by \_\_\_\_\_ which is \_\_\_\_\_chymatous.

90. Peripheral vascular bundles are generally larger than central ones. T/F

91. Phloem parenchyma is absent. T/F

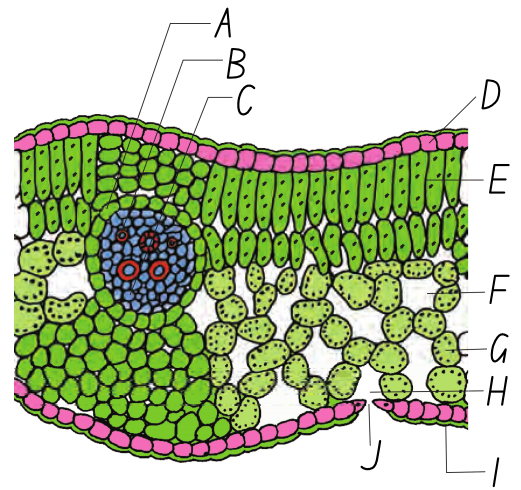
92. \_\_\_\_\_ cavities are present in vascular bundles of monocot stem.



**PARTH GOYAL**

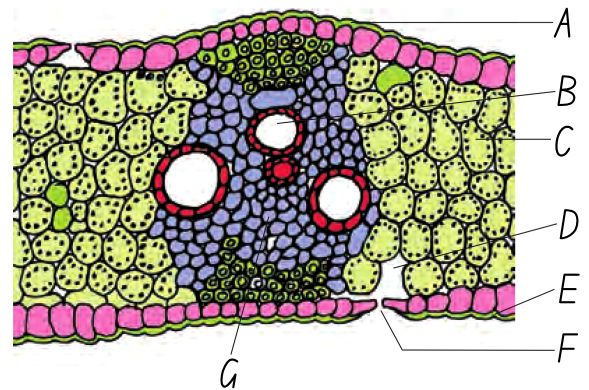
## • DICOT LEAF

93. Dicot leaf is \_\_\_\_\_ while monocot leaf is called \_\_\_\_\_
94. Adaxial epidermis means which cover the lower surface. T/F
95. Abaxial epidermis bear more stomata than adaxial epidermis. T/F
96. However, the amount of stomata on adaxial epidermis can never be zero. T/F
97. Mesophyll is made up of \_\_\_\_\_chyma.
98. Mesophyll have two kind of cells. Name them.
99. Palisade parenchyma is abaxially/adaxially placed.
100. In dicot/monocot, veins vary in thickness.
101. The vascular bundles are surrounded by layer of thin/thick walled bundle sheath cells.



## • MONOCOT LEAF

102. In monocot leaf, mesophyll is not differentiated. T/F
103. In \_\_\_\_\_, certain abaxial/adaxial epidermal cells along the veins modify themselves into bulliform cells.
104. These cells are large/small, empty/filled and colorful/colourless.
105. Fxn of bulliform cell –

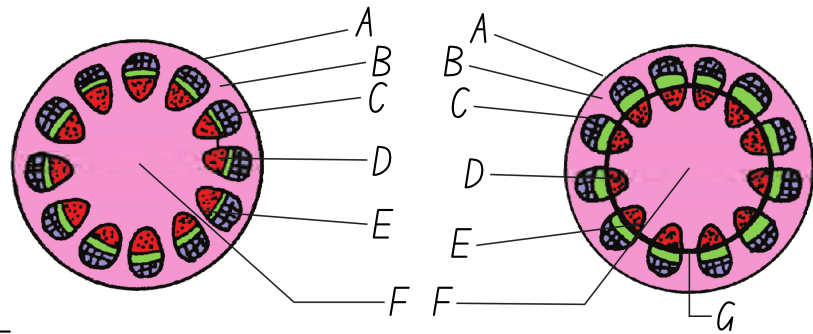


## • SECONDARY GROWTH

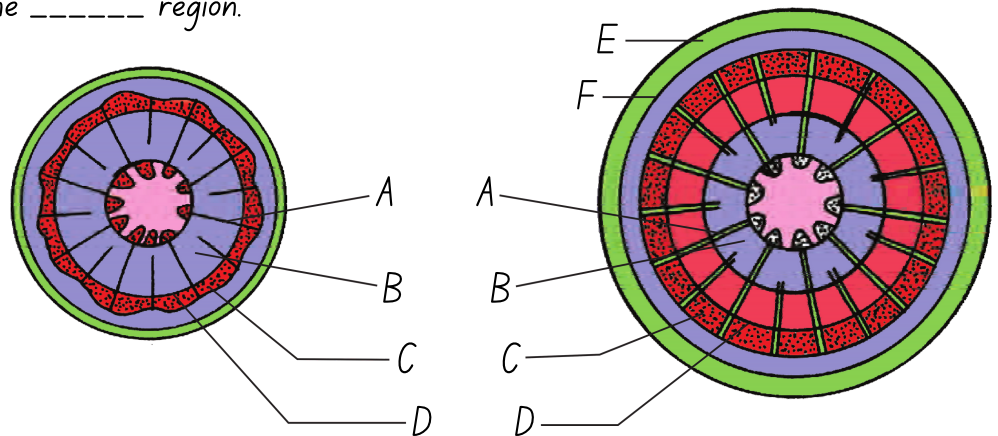
106. The cells of \_\_\_\_\_, become meristematic and form interfascicular cambium.
107. The cambium is more active on inner side than outer side. T/F
108. The primary xylem is crushed completely during secondary growth. T/F
109. The 1' and 2' phloem remain intact. T/F
110. A narrow band of parenchyma, which passes through the 2\* xylem and 2\* phloem in radial/longitudinal direction is called \_\_\_\_\_
111. In \_\_\_\_\_ season, cambium is very active, in \_\_\_\_\_ season cambium is less active.
112. In \_\_\_\_\_ season, wider cavities containing vessels are produced.
113. Spring wood also called \_\_\_\_\_
114. Late wood also called \_\_\_\_\_



115. Low and high density wood are \_\_\_\_\_ and \_\_\_\_\_ wood respectively.
116. The two kind of alternate ring, constitute \_\_\_\_\_ used to measure \_\_\_\_\_
117. Region comprise dead elements with highly lignified walls is called \_\_\_\_\_
118. In old trees, secondary xylem is dark brown due to deposition of (6)
119. As heartwood is made of xylem, it help in conduct of water. T/F
120. \_\_\_\_\_ is lighter in colour and located peripherally.
121. Secondary growth in a dicot stem (diagrammatic) – stages in transverse views



122. Cork cambium also called \_\_\_\_\_
123. Cork cambium develops in the \_\_\_\_\_ region.



124. Phellogen is made of narrow, thin walled rectangular cells. T/F
125. Phellogen cuts off cells only on one side. T/F
126. The outer cell differenciate into \_\_\_\_\_ or \_\_\_\_\_ and inner cell into \_\_\_\_\_ or \_\_\_\_\_
127. \_\_\_\_\_ deposition occur in cork.
128. The cells of 2<sup>o</sup> cortex are parenchymatous. T/F
129. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ are collectively called periderm.
130. \_\_\_\_\_ is a non-technical term which means tissues outside \_\_\_\_\_
131. Bark doesn't include secondary phloem. T/F
132. Bark doesn't include 2<sup>o</sup> xylem. T/F
133. Bark formed early in the season called \_\_\_\_\_ or \_\_\_\_\_ bark.
134. Bark formed at end of season called \_\_\_\_\_ or \_\_\_\_\_ bark.





135. Lenticles are \_\_\_\_\_ shaped openings.

136. Sometimes phellogen start cutting closely/widely arranged parenchymatous cells called \_\_\_\_\_ instead of cork cells and form \_\_\_\_\_ after rupture of epidermis.

137. Lenticel help in \_\_\_\_\_ exchange.

138. In stem vascular cambium is completely 2\* in origion. T/F

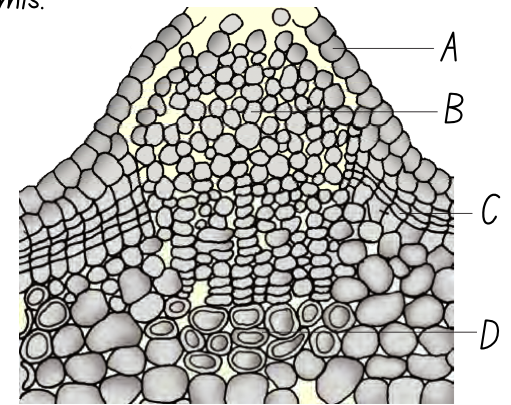
• Lenticel

139. In root, vascular cambium is completely 2\* in origion. T/F

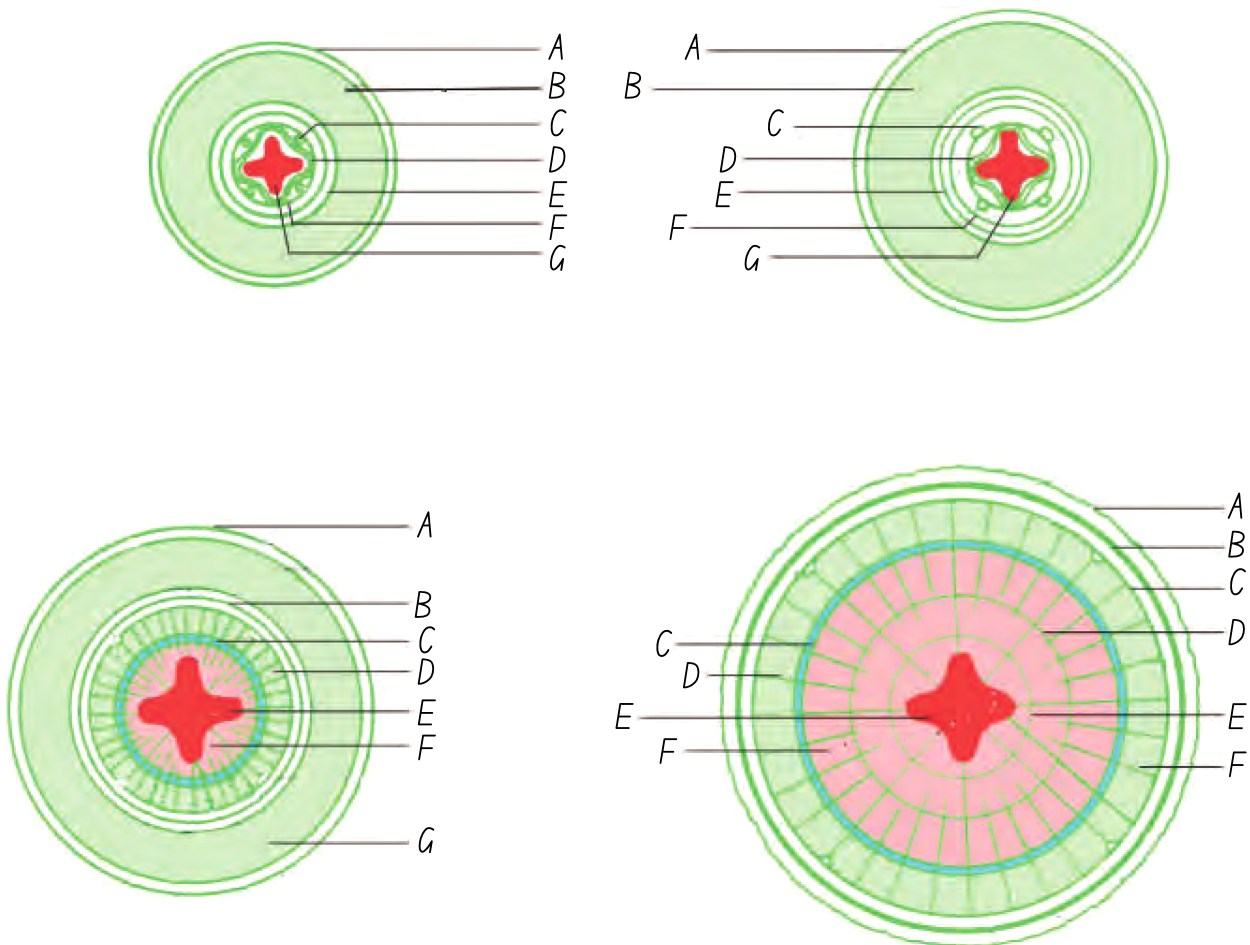
140. In roots, vascular cambium originate from (2)

141. Secondary growth doesn't occur in roots and stems of gymnosperms. T/F

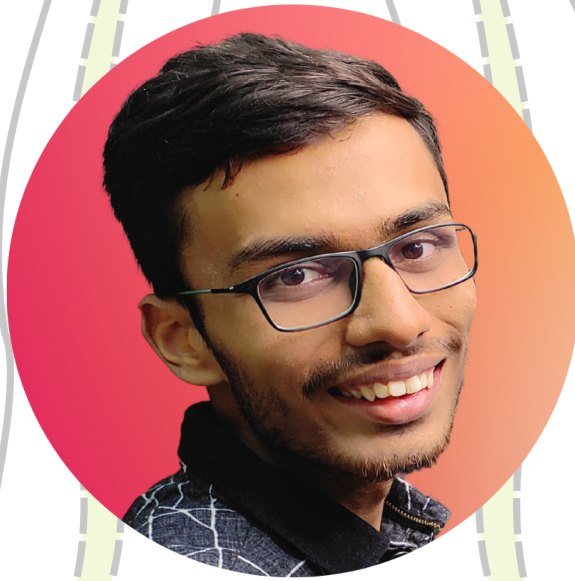
142. The wood is actually \_\_\_\_\_.



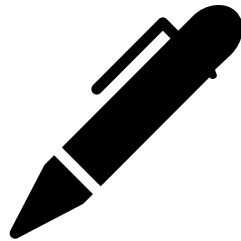
• Different stages of the secondary growth in a typical dicot root



# ANATOMY OF FLOWERING PLANTS



**PARTH** GOYAL



# ANSWERS



## ANSWERS

1) Anatomy

2) False

3) False

### • MERISTEMATIC TISSUES

4) Meristems

5) Meristos

6) Apical meristems

7) Root Apical meristem

A - Central cylinder

B - Cortex

C - Protoderm

D - Initials of central cylinder and cortex

E - Initials of root cap

F - Root cap

G - Root apical meristem

Shoot Apical meristem

A - Leaf primordium

B - Shoot apical

C - Meristematic zone

D - Axillary bud

E - Differentiating vascular tissue

8) Axillary bud

9) Apical and intercalary meristems

10) Grasses

11) Lateral meristems or cylindrical meristems

12) Interfascicular cambium, cork cambium & fascicular vascular cambium

13) Intrafascicular cambium

14) True

15) Parenchyma

16) Spherical, oval, round, polygonal or elongated

17) False

18) Photosynthesis, storage, secretion

19) Epidermis

20) Cellulose, hemicellulose and pectin

21) False

22) False, collenchyma does

23) False

24) Fibers & sclereids

25) Fruit wall of nuts, pulp of fruits like guava, pear & sapota, seed coat of legumes and leaves of tea

### • PERMANENT TISSUES

26) Tracheids, xylem parenchyma, xylem fibers, vessels

27) Xylem parenchyma

28) Gymnosperms

29) False

30) Vessel members

31) False

32) Vessels

33) True

34) True

35) Scratch or fat, tannins

36) Ray parenchymatous

37) Protoxylem and metaxylem

38) Centre, periphery

39) Endarch

40) Exarch



**PARTH GOYAL**

41) Sieve tube elements, companion cells. Phloem parenchyma & phloem fibers  
 42) Sieve tubes & companion cells by sieve cell & albuminous cells  
 43) End  
 44) False  
 45) Companion cells  
 46) Pit fields  
 47) Pressure gradient  
 48) Food material & other substance like resins, latex and mucilage  
 49) True  
 50) Monocot  
 51) Bast fibers  
 52) Sclerenchyma  
 53) False  
 54) Flax, hemp, jute  
 55) True

- Simple tissues

(a) Parenchyma  
 A - Intercellular space  
 (b) Collenchyma  
 A - Thickened corners  
 B - Protoplasm  
 C - Vacuole  
 D - Cell wall  
 (c) Sclerenchyma  
 A - Lumen  
 B - Thick cell wall  
 A - Pits  
 B - Lumen  
 C - Thick cell wall

- Complex Tissues

(a) Xylem  
 A - Tracheid  
 B - Vessels  
 (b) Phloem  
 A - Sieve pore  
 B - Sieve tube Element  
 C - Phloem parenchyma  
 D - Companion cell

## • THE TISSUE SYSTEM

56) Ground tissue system, epidermal tissue system, vascular tissue system  
 57) Epidermal cells, stomata, epidermal appendages - trichomes & hairs  
 58) False  
 59) Water  
 60) Roots  
 61) Diagram of stomata  
 A - Epidermal cells  
 B - Subsidiary cells  
 C - Chloroplast  
 D - Guard cells  
 E - Stomatal pore  
 62) Monocot  
 63) False  
 64) False  
 65) Guard cell, subsidiary cell & stomatal aperture  
 66) Unicellular  
 67) Multicellular  
 68) water, transpiration  
 69) Mesophyll  
 70) Dicots



71) Roots

• Various types of vascular bundles :

(a) radial

A - Xylem

B - Phloem

(b) conjoint closed

A - Phloem

B - Xylem

(c) conjoint open

A - Phloem

B - Cambium

C - Xylem

## • ANATOMY OF DICOT & MONOCOT PLANTS

72) Epiblema

73) Endodermis

74) Suberin

75) False

76) False

77) Pericycle

78) Conjunctive tissue

79) All tissue in innermost side of endodermis such as pericycle, vascular bundles and pith

• Dicot Root

A - Root hair

B - Epidermis

C - Cortex

D - Endodermis

E - Pericycle

F - Protoxylem

G - Metaxylem

H - Pith

I - Phloem

80) 6, polyarch

81) True

82) False

• Monocot Root

A - Root hair

B - Epidermis

C - Cortex

D - Endodermis

E - Pericycle

F - Phloem

G - Protoxylem

H - Pith

I - Metaxylem

83) Hypodermis, collenchymatous

84) Starch, starch sheath

85) Pericycle, sclerenchyma

86) Vascular bundles, dicot

87) True

• Dicot Stem

A - Epidermal hair

B - Epidermis

C - Hypodermis

D - Parenchyma

E - Endodermis

F - Pericycle

G - Vascular bundle

H - Medullary rays

I - Pith

A - Epidermis

B - Collenchyma

C - Parenchyma

D - Endodermis

E - Pericycle

F - Phloem

G - Cambium

H - Metaxylem

I - Protoxylem

J - Pith



**PARTH** GOYAL

88) Sclerenchymatous

89) Bundle sheath, sclerenchymatous

90) False

91) True

92) Water containing      A – Endodermis

• Monocot Stem      B – Hypodermis

A – Endodermis      C – Vascular bundles

B – Hypodermis      D – Phloem

C – Vascular bundles      E – Xylem

D – Ground tissue      F – Ground tissue

93) Dorsiventral, isobilateral

94) False

95) True

96) False

97) Parenchyma

98) Spongy & palisade

99) Adaxially

100) Dicot

101) Thick

• Dicot Leaf

A – Bundle sheath

B – Xylem

C – Phloem

D – Adaxial epidermis

E – Palisade mesophyll

F – Air cavity

G – Spongy mesophyll

H – Substomatal cavity

I – Abaxial epidermis

J – Stoma

## • SECONDARY GROWTH

102) True

103) Grasses, adaxial

104) Large, empty, colorless

105) Curl leaf inwards minimize water loss

• Monocot Leaf

A – Adaxial epidermis

B – Xylem

C – Mesophyll

D – Substomatal cavity

E – Abaxial epidermis

F – Stoma

G – Phloem

106) Medullary rays

107) True

108) False

109) False

110) Radial

111) Spring, winter

112) Spring

113) Early wood

114) Autumn wood, NOT WINTER WOOD

115) sap, heart

116) annual, age of plant (branch of study called dendrochronology)

117) Heartwood

118) Tannins, resins, oils, gums. Aromatic substances and essential oils

119) False

120) Sap wood



**PARTH GOYAL**



121) Different stages of the secondary growth in a typical dicot stem

A - Epidermis	A - Medullary rays
B - Cortex	B - Secondary xylem
C - Primary phloem	C - Secondary phloem
D - Vascular cambium	D - Cambium ring
E - Primary xylem	E - Phellem
F - Pith	F - Phellogen
G - Interfascicular cambium	

122) Phellogen

123) Cortex

124) True

125) False

126) Cork or phellem, secondary cortex or phelloderm

127) Suberin

128) True

129) Phellem, Phellogen, Phelloderm

130) Bark, vascular cambium

131) False

132) True

133) Early, soft

134) Late, hard

135) Lens

136) Closely, complimentary cells, lenticels

137) Gases

138) False

• Lenticel

A - Epidermis

B - Complimentary cells

C - Cork cambium

D - Secondary cortex

139) True

140) Tissue located just below phloem bundles, portion of pericycle, just above the protoxylem

141) False

142) Secondary xylem

• Different stages of the secondary growth in a typical dicot root

A - Epidermis

B - Cortex

C - Primary phloem

D - Cambial ring

E - Endodermis

F - Pericycle

G - Protoxylem

A - Epidermis

B - Cortex

C - Vascular cambium

D - Secondary phloem

E - Primary xylem

F - Secondary xylem

G - Cortex

A - Epidermis/periderm

B - Cortex

C - Primary phloem

D - Annual ring

E - Secondary xylem

F - Secondary phloem rays



**PARTH** GOYAL



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SCAN AND DONATE US SO THAT WE  
CAN CREATE MORE SUCH QUALITY  
CONTENT FOR YOU!

JUST ₹10-20 WILL BE APPRECIABLE! :)

COACHING INSTITUTES AFTER  
SEEING THESE BIOHACKS...

